REMARKS

In response to the Office Action mailed September 15, 2005, reconsideration of this application is respectfully requested in view of the remarks below and amendments to the drawings and specification made herein.

Claims 1-23 are pending.

Drawings

A replacement set of drawings (10 sheets of Figures 1-12) is included herewith. The replacement sheets include new Figure 10-12 which are added in response to the request in the Office Action. The Brief Description of the Drawing has been amended to refer to the added Figures, and brief descriptive paragraphs have been included at the end of the specification. No new matter has been added.

Rejections under 35 U.S.C. § 112, 1st para.

In the Office Action, claims 14-16 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with both the enablement requirement and the written description requirement. These rejections are respectfully traversed.

It is noted that the specification has been amended on page 5 (Summary) to include a prosaic form of the subject matter of claims 15-16. No new matter has been added.

With respect to the written description rejection, it is respectfully submitted that the application as filed includes a written description of the subject matter of claims 14-16. Claim 14 is identical to Claim 1 except that the beam generation element is specified as being transmissive in particular. Thus claim 14 itself describes a measurement apparatus including an optical sensor head having a source of a light beam and a plurality of light detecting elements, and a transmissive offset beam generation element operative to receive the light beam from the source and to return an offset light beam to the sensor head, the offset light beam providing a light spot that travels in a generally elliptical path over the light detecting elements as relative rotation occurs between first and second

members. As described in the paragraph beginning on page 13, line 26, in such a configuration the source and detector face each other and a transmissive beam generation element is disposed therebetween. Thus the optical sensor head of claim 14 is simply such as to achieve this arrangement, i.e., to hold the source and detecting elements on opposite sides of a transmissive beam generation element.

it is respectfully submitted that that the above description fully satisfied both the written description and enablement requirements. Sensor heads that achieve this arrangement are notoriously well known in the field of position encoders. It is noted in this regard that page 6 of the Office Action itself alleges that transmissive and reflective embodiments of encoders are equivalent, and choosing a particular embodiment requires only routine skill in the art. In support of this view, an example is shown below in the form of Figure 10 of US Patent 5,486,923, which is owned by the Assignee of the present application and also names the present inventor, William Thorburn, as a co-inventor. Figure 10 is reproduced below along with the following description (emphasis added):

"Prior to describing the features of the working prototype of FIGS. 8A-8E in greater detail, a second working prototype will be described briefly with reference to FIG. 10. The working prototype of FIG. 10 is a transmissive embodiment of the present invention. Grating 13A has a step profile similar to that shown in FIG. 3, but with a depth that is selected to permit the grating 13A to operate in transmission with phase retardation of .lambda./2, i.e. a 0.39 .mu.m depth for an operating wavelength of 785 nm. Thus, the light from laser diode 15 is collimated by collimating lens 17, passed through aperture 98 and then on to grating 13A. There, the grating profile generates the positive and negative first orders which interfere with one another. This natural interference is indicated by reference numeral 108 and occurs in the region between side 96A of grating 13A and detector 110.

...

"A mirror 106 is used to bend the natural interference 108 so that it has a path parallel to the axis of grating 13A. Detector 110 is positioned along this parallel path and within the region of natural interference between the positive and negative first orders.

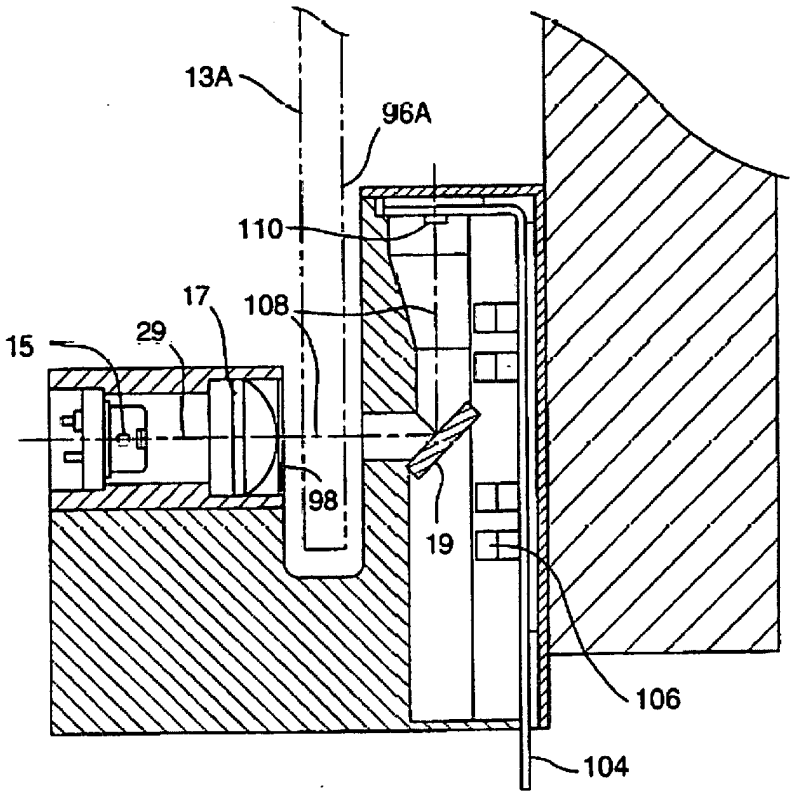

Figure 10 of the '923 patent clearly shows a single structure that supports both the source and the detector, on opposite sides of the grating 13A. This structure is but one example of a sensor head for a transmissive optical encoder. As the knowledge of this kind of structure was well known at the time of filing the present application, it is respectfully submitted that this application contains a fully adequate written description of the invention of claim 14 that satisfies the enablement requirement under 35 U.S.C. § 112, 1st paragraph.

It is assumed that the rejection of claims 15-16 is simply due to their dependence from claim 14, as there is not seen to be any separate basis for a

written description or enablement rejection in the Office Action. Thus, it is respectfully submitted that the application also contains a fully adequate written description of the invention of claims 15-16 that satisfies the enablement requirement under 35 U.S.C. § 112, 1st paragraph.

Rejections under 35 U.S.C. §102 and §103

Claims 1, 2, 4-12, 14, 17-20, and 23 were rejected under 35 U.S.C. §102(e) as being anticipated by U.S. Patent Application No. 2002/0014581 of Yamamoto et al. (Yamamoto). Claims 13, 15, 16 21 and 22 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yamamoto, and claim 3 was rejected under 35 U.S.C. §103(a) as being unpatentable over Yamamoto in view of U.S. Patent No. 6,564,168 of Hasser (Hasser). These rejections are respectfully traversed.

Claim 1 recites a measurement apparatus that includes an offset beam generation that produces "...a light spot that travels in a generally elliptical path over the light detecting elements," and a processor that determines "...the position of the offset beam of light along the elliptical path." Examples are shown in several of the Figures. Figure 7, for example, shows a beam generation element 300 that produces a beam 120 and a light spot 130 that travels over detecting elements 200 in the shape of an elliptical ring. it is important to note that the beam 120 itself moves in a manner similar to a searchlight as the beam generation element 300 rotates, such that the light spot 130 travels along the elliptical path of the detecting elements 200.

Yamamoto shows an optical rotary encoder using more conventional stationary-beam techniques. Figure 44 of Yamamoto for example, which is referred to in the Office Action, is described as follows (emphasis added):

"FIG. 44A is a perspective view showing a constitution of an optical rotary encoder 400 according to a sixteenth embodiment.

"In the encoder 400, a reflective scale 404 is irradiated with a laser beam emitted from a coherence light source, for example, a semiconductor laser 402,

and a reflected light pattern is generated on the light receiving surface of a photodetector 406.

"Here, the scale 404 is a disc-shaped rotary scale which rotates around a circle center 408 as a rotation axis to cross the light beam emitted from the light source, and in which a radial optical pattern 410 with a predetermined angle period is formed to be irradiated with the light beam.

"Moreover, the photodetector 406 has a plurality of light receiving areas 412, disposed in the radial shape from the circle center 408, for receiving the light beam transmitted via the optical pattern 410 and detecting the bright/dark pattern generated by the optical pattern 410.

"Additionally, the semiconductor laser 402 is also disposed in the circle center.

"Moreover, the rotary scale 404 is irradiated with the laser beam emitted from the semiconductor laser 402 as a circular pattern 414, and the beam is reflected by the optical pattern 410 on the rotary scale 404 to form an image forming pattern 416 on the light receiving surface of the photodetector 406.

Thus Yamamoto describes an encoder having a cone-shaped reflected beam that does not move, but rather includes a bright/dark pattern that changes in a manner detectable by the detector 406 as the scale 404 rotates. The light from the photodetector 406 is a stationary beam that forms a circular pattern 414 concentric with the rotary scale 404, and the scale 404 produces a stationary reflected beam having another circular pattern 416.

It is respectfully submitted that Yamamoto does not anticipate claim 1 under 35 U.S.C. § 102(e), because it does not each all the element thereof. Specifically, Yamamoto does not teach a measurement apparatus that includes an offset beam generation that produces "...a light spot that travels in a generally elliptical path over the light detecting elements," and a processor that determines "...the position of the offset beam of light along the elliptical path" as set forth in claim 1. Yamamoto's beam is stationary and centered on the array of detector elements 412). Rotary motion is detected by detecting a change in a light/dark

pattern (created by the scale 404) within this stationary circular beam, not by detecting motion of the beam itself around a circle. Thus, Yamamoto fails to teach at least these aspects of claim 1, and accordingly cannot anticipate claim 1 under 35 U.S.C. § 102(e).

Although the Office Action also indicates that several additional claims are allegedly anticipated by Yamamoto, there is not seen to be any specific discussion of at least claims 7, 8, 19, and 20. Claim 7 recites that the beam generating element produces a beam of light propagating in a direction at a predetermined offset angle with respect to a rotation axis between the first and second members. An example of this configuration is shown in Figure 1 of the application as filed. Claim 8 recites the production of two beams, a first beam propagating at a predetermined angle with respect to the rotation axis and the second beam propagating substantially along the rotation axis. Claims 19 and 20 recited specific unique characteristics of a spot from a first beam of light, namely a unique polar angular location and a unique optical intensity, which as described in the specification are used to achieve a non-ambiguous position indication. None of these features is seen to be specifically addressed in the Office Action, nor to be taught or suggested in Yamamoto or the other art of record.

In addition to the above, the rejection of claims 21-22 under 35 U.S.C. § 103(a) is specifically traversed. The Office Action states that Yamamoto does not disclose an aperture or lens for reducing the size of the light spot on the detector elements as set forth in these claims, but alleges that such would have been obvious "to obtain a desired spot size for improved detection." This rejection has no basis in Yamamoto or the other art of record and therefore cannot properly support the rejection of claims 21-22. Yamamoto does not employ traveling light spots to indicate position, and therefore Yamamoto's encoders are not sensitive to the profile of a moving light spot. Yamamoto employs a stationary beam with a moving pattern of light/dark areas within the beam. There is no apparent advantage to be gained in Yamamoto from reducing the size of the beam, either for improved detection or any other reason. Thus, it

is respectfully submitted that claims 21 and 22 are even further distinguished from, and not obvious in view of, Yamamoto.

In view of the foregoing remarks, this Application is believed to be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Response, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the undersigned Attorney at the number below.

Applicant hereby petitions)for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-3661.

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 616-2900, in Westborough, Massachusetts.

Respectfully submitted,

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IN THE DRAWING

Enclosed are replacement sheets 1-10 to be substituted for original sheets 1-7.